

Climate Trends, Grant-Kohrs Ranch National Historic Site, Montana

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Historical and projected climate trends for the park (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

	mean	SD	mean	SD
Historical (1950-2010)				
temperature annual average	+5.5	0.7 °C	+42	1 °F.
temperature linear trend	+0.3	N.S. °C/century	+1	N.S. °F./cent.
precipitation annual average	+270	60 mm/y	+11	2 in./year
precipitation linear trend	+13	N.S. %/century	+13	N.S. %/century
Projected (2000-2100)				
Lowest emissions scenario (IPCC RCP 2.6)				
temperature annual average trend	1.8	0.8 °C/century	3	1 °F./cent.
precipitation annual average trend	+6	5 %/century	+6	5 %/century
Medium emissions scenario (IPCC RCP 4.5)				
temperature annual average trend	3.0	0.9 °C/century	5	2 °F./cent.
precipitation annual average trend	+7	7 %/century	+7	7 %/century
High emissions scenario (IPCC RCP 6.0)				
temperature annual average trend	3.4	0.9 °C/century	6	2 °F./cent.
precipitation annual average trend	+9	7 %/century	+9	7 %/century
Highest emissions scenario (IPCC RCP 8.5)				
temperature annual average trend	5.2	1.2 °C/century	9	2 °F./cent.
precipitation annual average trend	+10	7 %/century	+10	7 %/century

SD = standard deviation; Sig. = statistically significant; N.S. = not statistically significant

Figure 1.

Average annual temperature (1895-2010) for the area within the park boundaries (data Daly et al. 2008; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

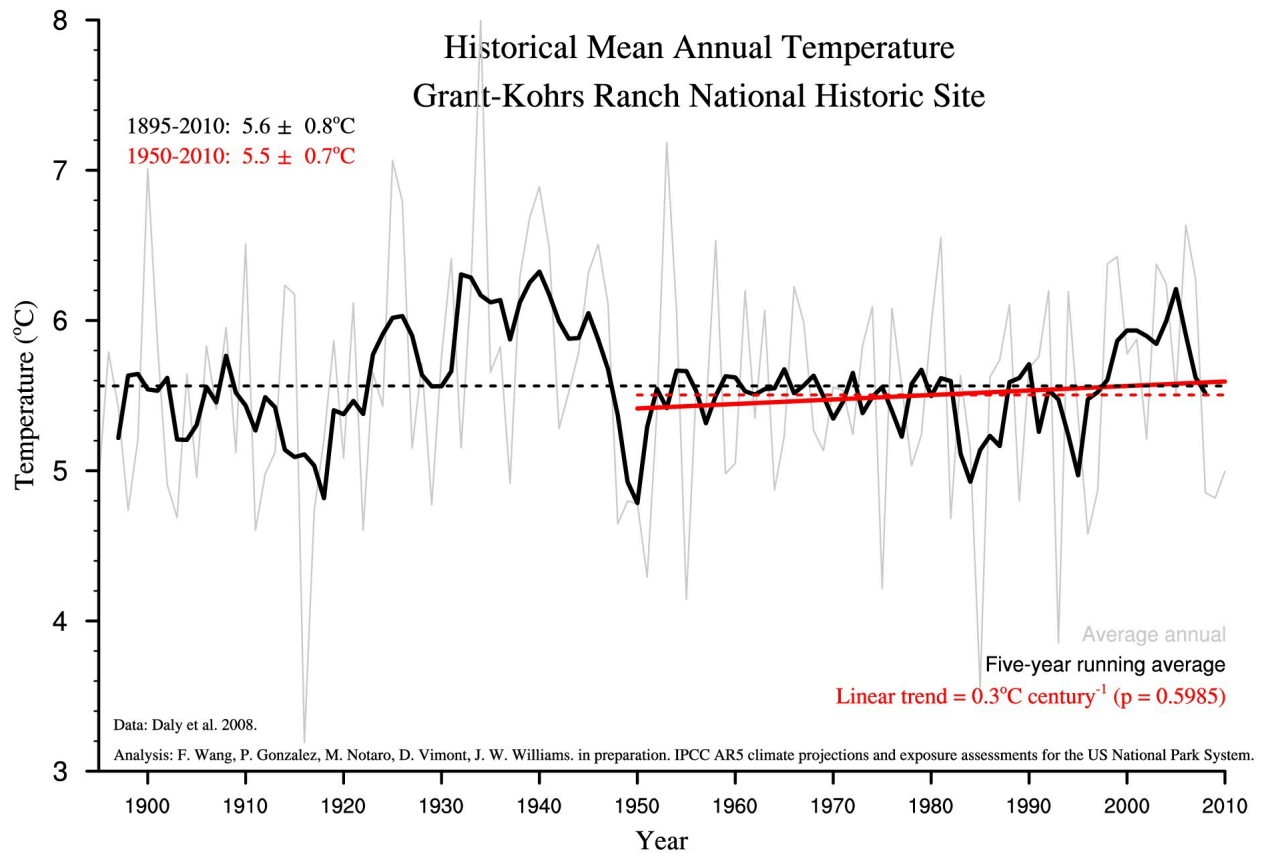


Figure 2.

Average annual temperature (1950-2010) across the landscape (data Daly et al. 2008; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

Linear Trend in Historical Mean Annual Temperature ($^{\circ}\text{C century}^{-1}$)
1950 - 2010
Grant-Kohrs Ranch National Historic Site



Data: IPCC 2013, Daly et al. 2008. Analysis: F. Wang, P. Gonzalez, M. Notaro, D. Vimont, J. W. Williams. In preparation.
IPCC AR5 climate projections and exposure assessments for the US National Park System.



Figure 3.

Average annual precipitation (1895-2010) for the area within the park boundaries (data Daly et al. 2008; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

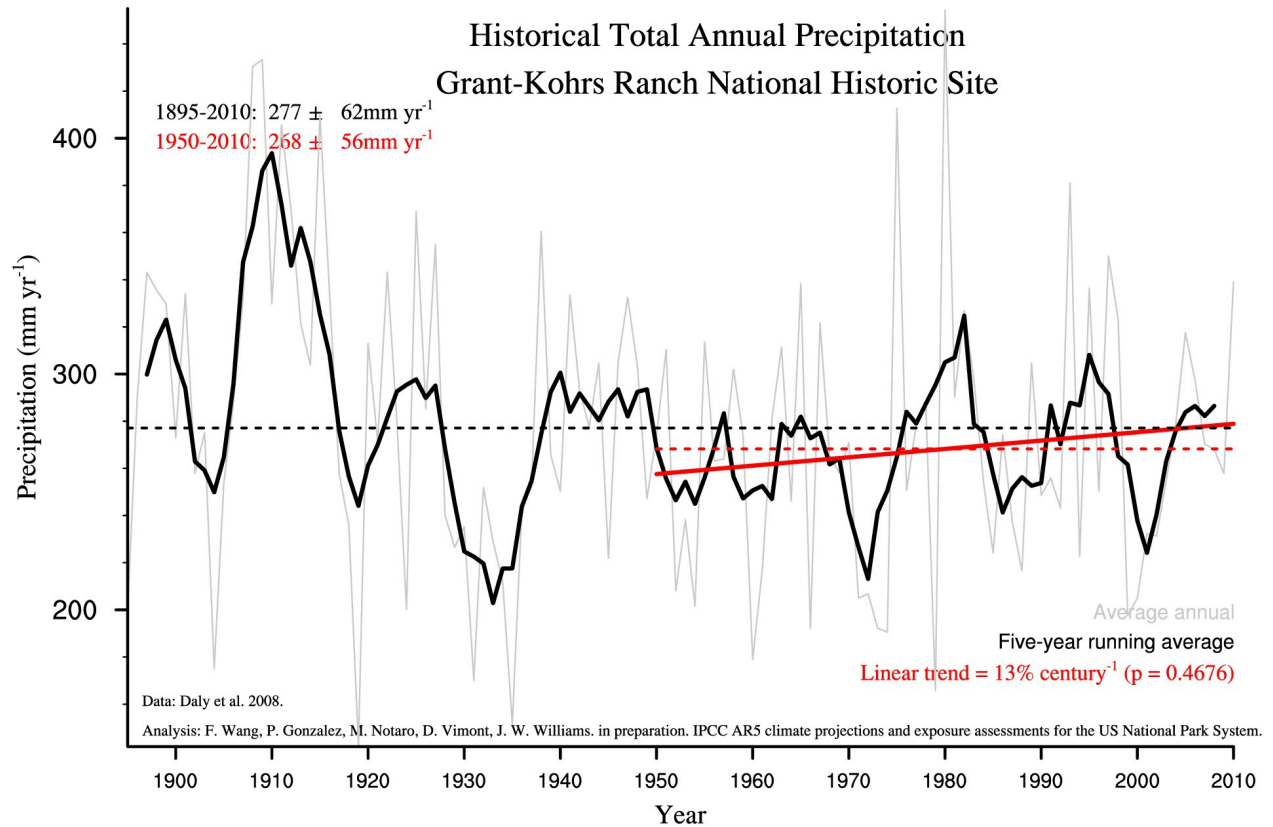


Figure 4.

Projected change in average annual temperature (difference between 2071-2100 average and 1971-2000 average), for the high emissions scenario (IPCC RCP 6.0) (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

Projected Mean Annual Temperature Change RCP6.0 (°C)
Grant-Kohrs Ranch National Historic Site
(Difference between 2071-2100 average and 1971-2000 average)



Data: IPCC 2013. Daly et al. 2008. Analysis: F. Wang, P. Gonzalez, M. Notaro, D. Vimont, J. W. Williams. In preparation.
IPCC AR5 climate projections and exposure assessments for the US National Park System.



Figure 5.

Projected change in average annual precipitation (difference between 2071-2100 average and 1971-2000 average), for the high emissions scenario (IPCC RCP 6.0) (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).

Projected Total Annual Precipitation Change RCP6.0 (%)
Grant-Kohrs Ranch National Historic Site
(Difference between 2071-2100 average and 1971-2000 average)

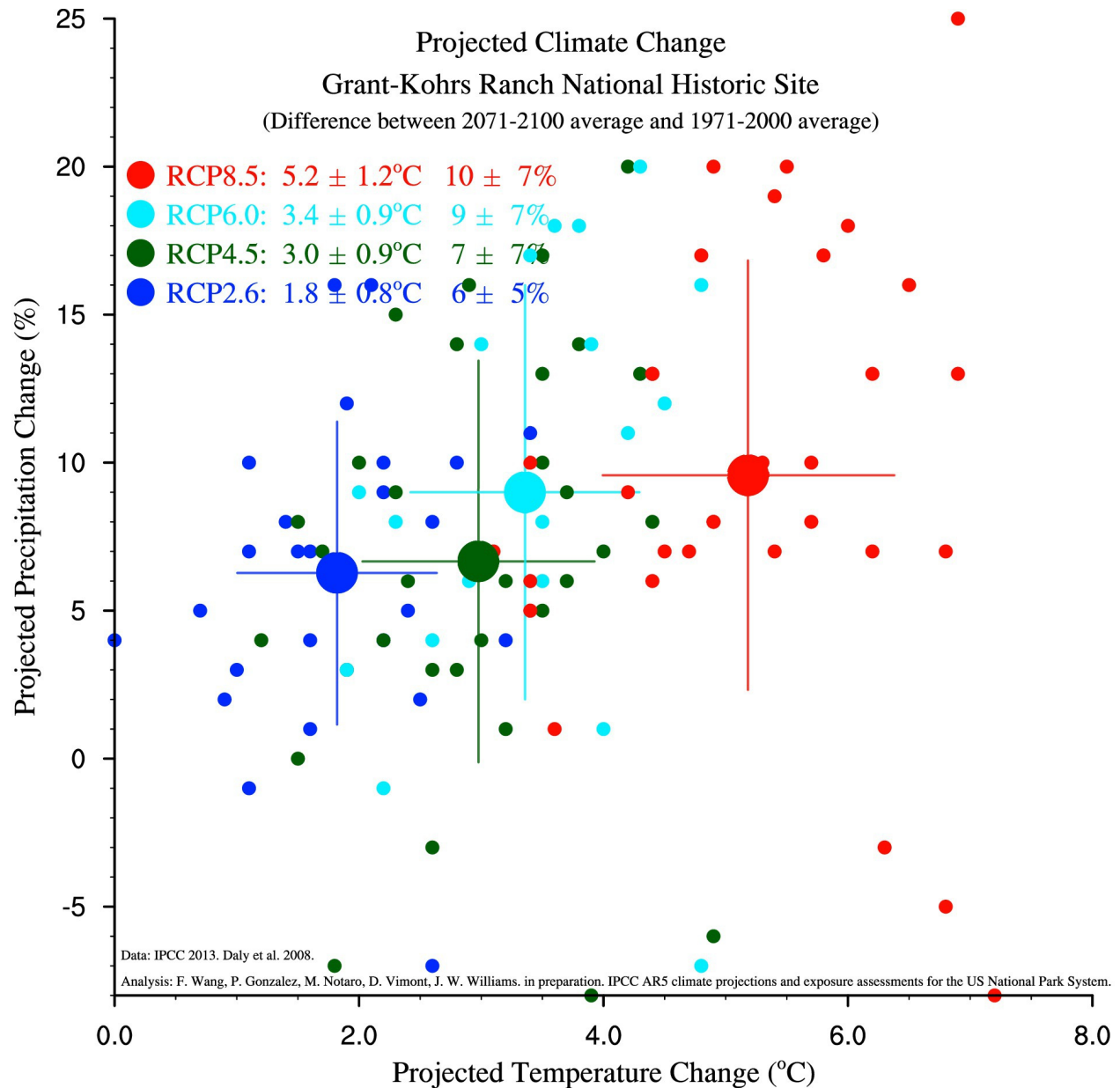


Data: IPCC 2013. Daly et al. 2008. Analysis: F. Wang, P. Gonzalez, M. Notaro, D. Vimont, J. W. Williams. In preparation.
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Figure 6.

Projected changes in average annual temperature and precipitation for all emissions scenarios (small circle = individual general circulation models, large circle = average of all general circulation models, bars = standard deviation) for the area within the park boundaries (data Daly et al. 2008, IPCC 2013; analysis Wang et al. in preparation, University of Wisconsin and U.S. National Park Service).



References

- Daly, C., M. Halbleib, J.I. Smith, W.P. Gibson, M.K. Doggett, G.H. Taylor, J. Curtis, and P.P. Pasteris. 2008. Physiographically sensitive mapping of climatological temperature and precipitation across the conterminous United States. *International Journal of Climatology* 28: 2031–2064.
- Intergovernmental Panel on Climate Change (IPCC). 2013. *Climate Change 2013: The Physical Science Basis*. Cambridge University Press, Cambridge, UK.
- Wang, F., P. Gonzalez, M. Notaro, D. Vimont, and J.W. Williams. in preparation. IPCC AR5 climate projections and exposure assessments for the US National Park System.